Siemens Industry, Inc.	INSTALLATION AND SERVICE INSTRUCTION

SD42H
Rev 9
October 2012
Supersedes Rev 8

Model 42H Nullmatic Pressure Regulator, High Capacity

INTRODUCTION

The Model Series 42H Nullmatic® Pressure Regulator (high capacity), shown below, is used typically to control air pressure in pneumatic instrument circuits, test stands, production checking fixtures, etc. It uses a two-stage, pilot operated, null-balance principle of operation which maintains the output pressure despite wide changes in output flow or supply pressure.

This instruction has five major sections: Introduction, Installation, Principle of Operation, Maintenance, and Parts List.

Model Designation

Model Series 42H A 50

42H

Options

A	Air Loaded
E	Tapped Exhaust
-	(no letter) Standard

Range

30	1 to 30 psi
50	1 to 50 psi
100	1.5 to 100 psi

General Specifications

Supply Pressure .....See Table below

Model No	Recommended (psi)	Maximum (psi)	Minimum
42H-30	120	150	10 psi above desired output
42H-50	120	150	
42H-100	150	500	

Note: Performance will be improved by increasing the supply pressure above the minimum value.

Maximum Air Loading..... 100 psi (air loaded models only)
Ambient Temperature Limits ..... -40°C to 82°C (-40°F to 180°F)
Maximum Air Flow, scfm Delivered..... See Graph 1 on page 3
Air Consumption ..... See Graph 2 on page 3
Mounting ..... In-line, bracket or flush panel on panels up to 1/4" thick
Ambient Temperature Effect* ..... Approximately 1% of set pressure with standard range spring
Approximately 0.1% of set pressure with optional isothermal range spring

*For a 50°F temperature change; isothermal range spring option discontinued

INSTALLATION

The Regulator may be pipe-mounted, bracket-mounted, or flush panel-mounted. Refer to Figures 1, 2, and 3 for installation dimensions and connections. The direction of air flow, from supply to output, is indicated by an arrow on the bottom forging. The Regulator may be mounted in any position, in a reasonably vibration-free location.

CAUTION

Exceeding the ambient air temperature limits can adversely affect performance and may cause damage.

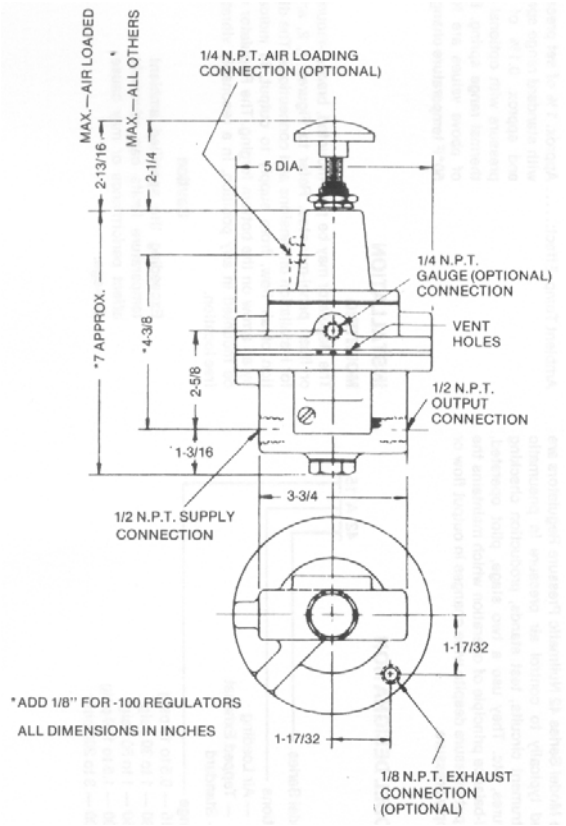


Figure 1 Dimensions and Connections

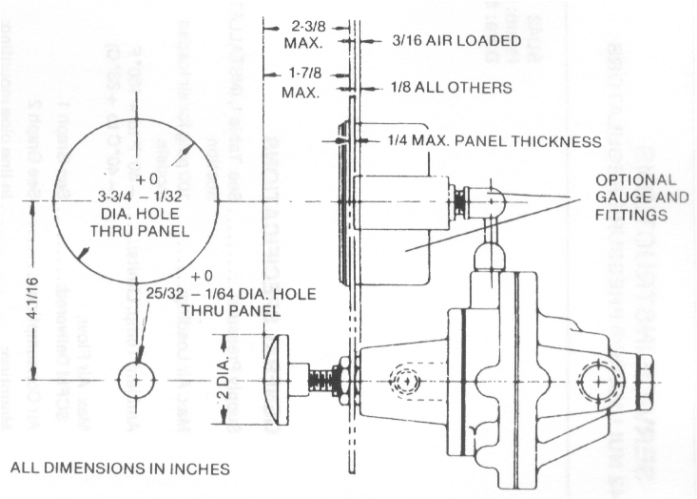


Figure 2 Panel Mounted Regulator

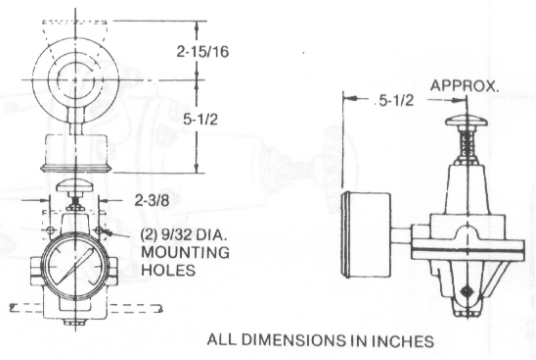


Figure 3 Pipe or Bracket-Mounted Regulator

Pneumatic Connections

Supply and output connections are 1/2" NPT, the optional air loading connection is 1/4" NPT, and the optional tapped exhaust is 1/8" NPT.

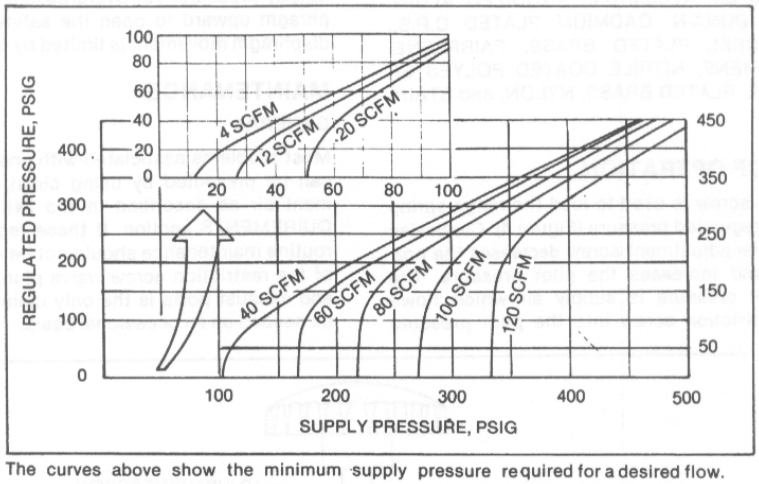
Recommended piping to the regulator is 1/4" O.D. tubing, although any scale free piping may be used.

1. Blow out all piping before any connections are made to prevent dirt or chips from entering the regulator.
2. Use pipe sealant sparingly, and then only on the male threads. A non-hardening sealant is strongly recommended.
3. Connect the regulator to a source of clean, dry, oil-free instrument air. See Instrument Air Requirements.

CAUTION

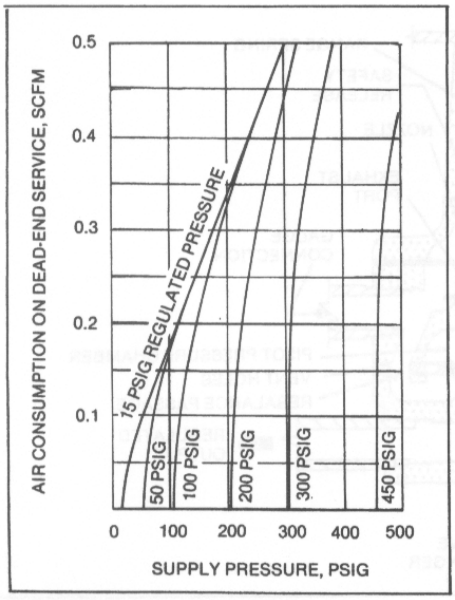
Pressure to the supply or output connection in excess of the maximum value listed in General Specifications may cause damage. Air loading pressure in excess of 100 psi may cause damage in air loaded models.

See the inset on page 4 for a description of Nullmatic operation.



The curves above show the minimum supply pressure required for a desired flow.

Graph 1 Maximum Air Flow, SCFM Delivered



Graph 2 Air Consumption

Instrument Air Requirements

Connect the regulator to a source of clean, dry, oil-free instrument air. Failure to do so will increase the possibility of a malfunction or deviation from specified performance.

CAUTION

Use of process fluids other than instrument air is not recommended. No claim is made as to the suitability of this product for use with other process fluids, such as hazardous gases, except as listed on the appropriate certificate. Non-approved instruments are suitable for use with instrument air only. Optional features and modifications such as tapped exhaust do not imply suitability for use with hazardous gases except as listed on the approval certificate.

CAUTION

Synthetic compressor lubricants in the air stream at the regulator may cause the regulator to fail.

There are many types of synthetic lubricants. Some may not be compatible with the materials used in construction of the regulator. Wetting of these materials by such an oil mist or vapor, etc. may cause them to deteriorate. This may ultimately result in failure of the regulator. The following materials are in contact with instrument air: ALUMINUM, ANODIZED ALUMINUM, BRASS, BUNA-N, CADMIUM PLATED C.R.S, CHROMED NICKEL PLATED BRASS, FAIRPRENE, MONEL, NEOPRENE, NITRILE COATED POLYESTER FABRIC, NICKEL PLATED BRASS, NYLON, and STAINLESS STEEL.

The requirements for a quality instrument air supply can be found in the Instrument Society of America's "Quality Standard for Instrument Air" (ISA-S7.3). Basically this standard calls for the following:

Particle Size - The maximum particle size in the air stream at the instrument should be no larger than 3 microns.

Dew Point - The dew point, at line pressure, should be at least 10° C (18° F) below the minimum temperature to which any part of the instrument air system is exposed at any season of the year. Under no circumstances should the dew point, at line pressure, exceed 2° C (35.6° F).

Oil Content - The maximum total oil or hydrocarbon content, exclusive of non-condensables, should not exceed 1 ppm under normal operating conditions.

PRINCIPLE OF OPERATION

The adjustment screw is used to load the range spring which sets the regulated pressure; see Figure 4. Clockwise adjustment of the adjustment screw decreases the nozzle clearance and increases the pilot pressure. The source for pilot pressure is supply air which flows through the restriction screw into the pilot pressure chamber. An increase in pilot pressure forces the exhaust diaphragm assembly downward, closes the exhaust port, and moves the valve plunger to open the supply port. This increases the output pressure which feeds back via the rebalance passage to the top diaphragm assembly. When the upward force of the output pressure (acting on the bottom of the top diaphragm assembly) equals the downward force of the range spring (acting on the top of the top diaphragm assembly) the regulator will be in balance. All actions are reversed for counterclockwise adjustment of the adjustment screw.

A safety release valve is incorporated in the top diaphragm assembly of the 42H-30, and 42H-50 Models. It exhausts air through the top casting if the output pressure becomes 3 to 15 psi above the adjusted output pressure. An overpressure moves the top diaphragm upward to open the safety release valve. The diaphragm movement is limited by the stripper plate.

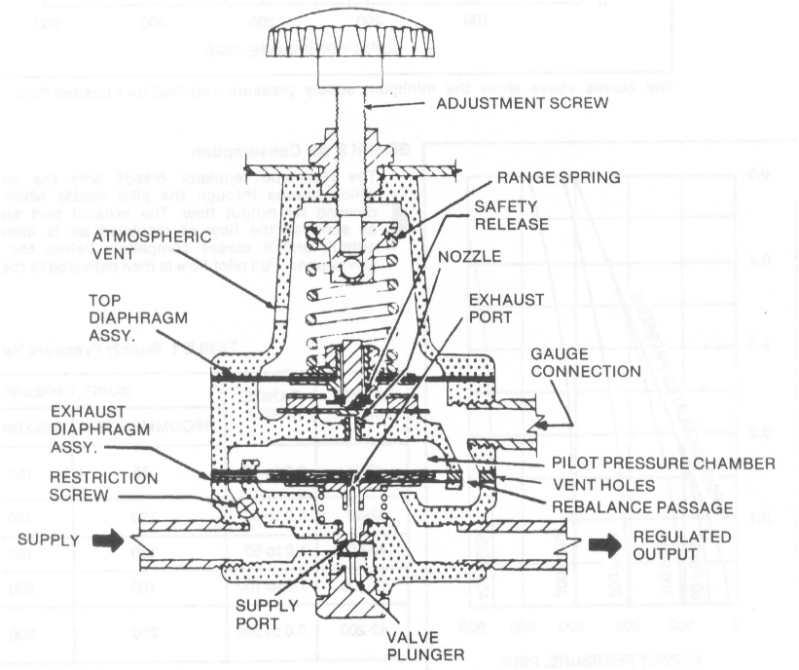


Figure 4 Schematic

The Nullmatic regulator bleeds only the amount of air which passes through the pilot nozzle when there is no demand for output flow. The exhaust port starts to close as soon as the flow of regulated air is increased to the output and it closes completely before the pilot-plunger valve opens. Full pilot flow is then delivered to the output.

MAINTENANCE

Most problems associated with pneumatic instruments can be prevented by using clean, dry, oil-free instrument air as described in the Instrument Air Requirements section. If these requirements are met, routine maintenance should not be necessary. Cleaning of the restriction screw, valve plunger, and the supply and exhaust ports is the only maintenance which may be needed on an occasional basis.

Refer to the Trouble Analysis table below when troubleshooting the regulator.

Trouble Analysis

Symptom	Cause	Remedy
No output	No supply air	Turn on supply air.
	Clogged restriction screw	Refer to the Cleaning section and clean the restriction screw
Output cannot be increased to full value	Supply air setting too low	Refer to the table on page 1 and raise supply pressure
	Valve plunger not seating in the exhaust port due to a chip (e.g. pipe dope, Teflon tape, thread shaving, pipe scale). Usually detected by a heavy exhaust.	Refer to Cleaning section and clean the valve plunger and exhaust port
	Partially obstructed restriction screw	Refer to Cleaning section and clean the restriction screw
Sluggish output response to increased setting	Output flow exceeds specification	See Graph 1 or raise supply pressure
	Partially obstructed restriction screw	Refer to Cleaning section and clean the restriction screw
Output at full value or higher and cannot be decreased	Regulator piped backwards – excessively heavy exhaust	Refer to Installation section and re-pipe the regulator
	Loose restriction screw	Tighten the restriction screw
	Exhaust external vent holes blocked	Remove obstruction
	Exhaust port clogged	Refer to Cleaning section and clean the exhaust port
Output cannot be decreased to minimum value	Supply pressure too high	Refer to the table on page 1 and decrease supply pressure
	Loose restriction screw	Tighten the restriction screw
	Valve plunger not seating in the exhaust port due to a chip (e.g. pipe dope, Teflon tape, thread shaving, pipe scale). Usually detected by a heavy exhaust.	Refer to Cleaning section and clean the valve plunger and exhaust port
	Heavy buildup on nozzle seat	Refer to Cleaning and clean the nozzle seat
Exhaust from vent hole in top casting (Models 42H-30, and 42H-50 only)	Safety release valve operating normally – see Principle of Operation	None

Cleaning

The items that will normally require cleaning are the restriction screw, valve plunger, and supply and exhaust ports. Refer to Figure 5 during the following procedures.

Restriction Screw

1. Turn off supply air.
2. Remove restriction screw by turning it counterclockwise with a screwdriver.
3. Remove filter screen from restriction screw by sliding it off.
4. Inspect filter screen for rips, tears, etc.; replace as necessary.
5. Inspect the O-ring for cuts, gouges, etc.; replace as necessary.
6. Remove cleaning wire from bottom forging.
7. Insert the cleaning wire into the orifice on the end of the restriction screw. Move the cleaning wire in and out several times to clear the orifice. If the cleaning wire cannot be inserted into the orifice, soak the restriction screw in solvent first to dissolve the blockage.
8. Wipe the restriction screw and O-ring clean or clean with a non-abrasive solvent.
9. Soak the filter screen in solvent and/or blow through with compressed air to remove blockage.
10. Place filter screen on restriction screw.
11. Install restriction screw in bottom forging by turning it clockwise with a screwdriver. Ensure restriction screw is turned in tightly.
12. Replace cleaning wire in bottom forging.
13. Return regulator to service.

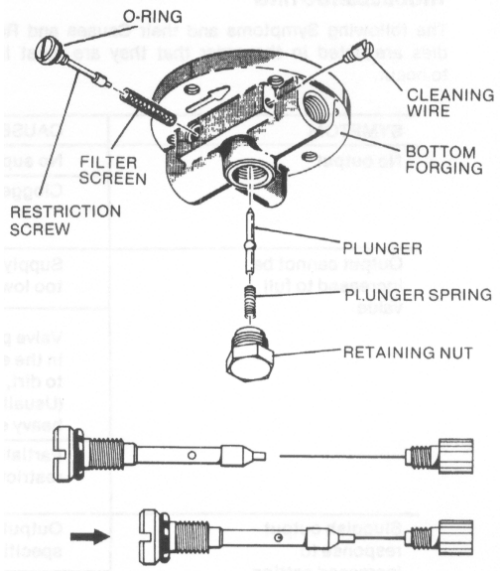


Figure 5 Cleaning

Valve Plunger and Supply and Exhaust Ports

1. Turn off supply air.
2. Remove the retaining nut from the bottom forging with a 3/4" wrench. The valve plunger and plunger spring should fall out.
3. Wipe the valve plunger clean, or, if necessary, clean with a non-abrasive solvent.
4. Clean the supply and exhaust ports. The supply port is easily accessible; the exhaust port can be reached with a tobacco pipe cleaner. Use a non-abrasive solvent to clean.

NOTE

If excessive dirt, buildup, etc., is encountered, the regulator should be disassembled for thorough cleaning. Read the Disassembly and Assembly sections before disassembling the regulator.

5. Place plunger spring on valve plunger.
6. Place valve plunger into bottom forging.
7. Install and tighten retaining nut.
8. Return regulator to service.

Lubrication

The only lubrication that may be required is the lubrication of the adjustment screw threads with light grease. Other lubrication is neither recommended nor required.

Disassembly

1. Remove regulator from service.
2. Turn the adjustment screw counterclockwise to relieve the range spring tension.
3. Make a diagonal mark across all mating parts. This will provide for easier alignment during assembly.
4. Refer to the Parts List, remove the body screws, and disassemble the regulator.

Assembly

1. Refer to the Parts List and assemble regulator.
2. Observe the following hints.
    1) Position the exhaust diaphragm assembly on the bottom forging so that none of the holes in the periphery of the bottom forging are blocked.
    2) Position the exhaust ring on the exhaust diaphragm assembly to locate the 3 vent holes in the ring under the gauge connection (see Figure 1).
    3) Position the center casting on the exhaust ring as shown in Figure 1.
    4) Install the nozzle seat assembly in the center casting before installing the stripper plate.
    5) Position the top casting on the top diaphragm assembly. Typically, the nameplate will be located over the gauge connection.
3. Return regulator to service.

Range Change

The range of a regulator can be changed by simple substitution of parts. Change the range of a regulator by doing the following.

1. Obtain the model number of the regulator from the regulator nameplate located on the top casting.
2. Determine from the Model Designation section the model number of the desired range.
3. Refer to the Parts List.
4. List all parts of the desired model that are different from the existing model.
5. Order these parts from Siemens; see the Customer/Product Support section below.
6. Refer to Disassembly and Assembly sections and substitute new parts.
7. Document this change on drawings, records, etc.

Options and Modifications

The following are standard options and modifications available for all Model 42H regulators except where noted.

Air-Loading

To provide for supplementary air loading (100 psig maximum) in addition to normal spring loading, include "A" in the model number. Consult factory. See page 1.

Tapped Exhaust

To provide for piping exhaust flow away from the regulator, include "E" in the model number. Consult factory. See page 1.

Safety Release Valve

Increases exhaust flow capacity when the regulator must exhaust large flows - standard on Models 42H-30 and 42H-50. Not available for other ranges. To delete the safety release valve, include "X" in the model number. Consult factory.

Pressure Gauge

For direct reading of regulated pressure, specify fittings, if required (see Figure 2). Consult factory.

Customer/Product Support

This section provides the Siemens public Internet site address, e-mail address, telephone numbers, and related information for customers to access Siemens product support.

When contacting Siemens for support:

- Please have complete product information at hand:
    - For hardware, this information is provided on the product nameplate (part number or model number, serial number, and/or version).
    - For most software, this information is given in the Help > About screen.
- If there is a problem with product operation:
    - Is the problem intermittent or repeatable? What symptoms have been observed?
    - What steps, configuration changes, loop modifications, etc. were performed before the problem occurred?
    - What status messages, error messages, or LED indications are displayed?
    - What troubleshooting steps have been performed?
    - Is the installation environment (e.g. temperature, humidity) within the product's specified operating parameters? For software, does the PC meet or exceed the minimum requirements (e.g. processor, memory, operating system)?
- A current copy of the product Service Instruction, User's Manual, or other technical literature should be at hand. The Siemens public Internet site (see the table) has current revisions of technical literature, in Portable Document Format, for downloading.
- To send an instrument to Siemens for repair, request a Return Material Authorization (RMA).

IMPORTANT

An instrument must be thoroughly cleaned (decontaminated) to remove any process materials, hazardous materials, or blood born pathogens prior to return for repair. Read and complete the Siemens RMA form(s).

For support and the location of your local Siemens representative, refer to the table below for the URL of the Process Instrumentation (PI) portion of the Siemens public Internet site. Once at the site, click **Support** in the right column and then **Product Support**. Next select the type of support desired: sales, technical (see the table below), documentation, or software.

Online Support Request	http://www.siemens.com/automation/support-request
Technical Support	1-800-333-7421; 8 a.m. to 4:45 p.m. eastern time, Monday through Friday (except holidays)
Customer Service & Returns	1-800-365-8766 (warranty and non-warranty)
Public Internet Site	http://www.usa.siemens.com/pi
Technical Publications in PDF	Click the above link to go to the Siemens Internet site and then click **Process Instrumentation**. In the column to the right, click **Support** > **Manuals**. In the column to the left, select the product line (e.g. Pressure or Temperature or Controllers) to open navigation and search panes. Note: Navigation may change as the site evolves.

Warranty

The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements continued herein do not create new warranties or modify the existing warranty.

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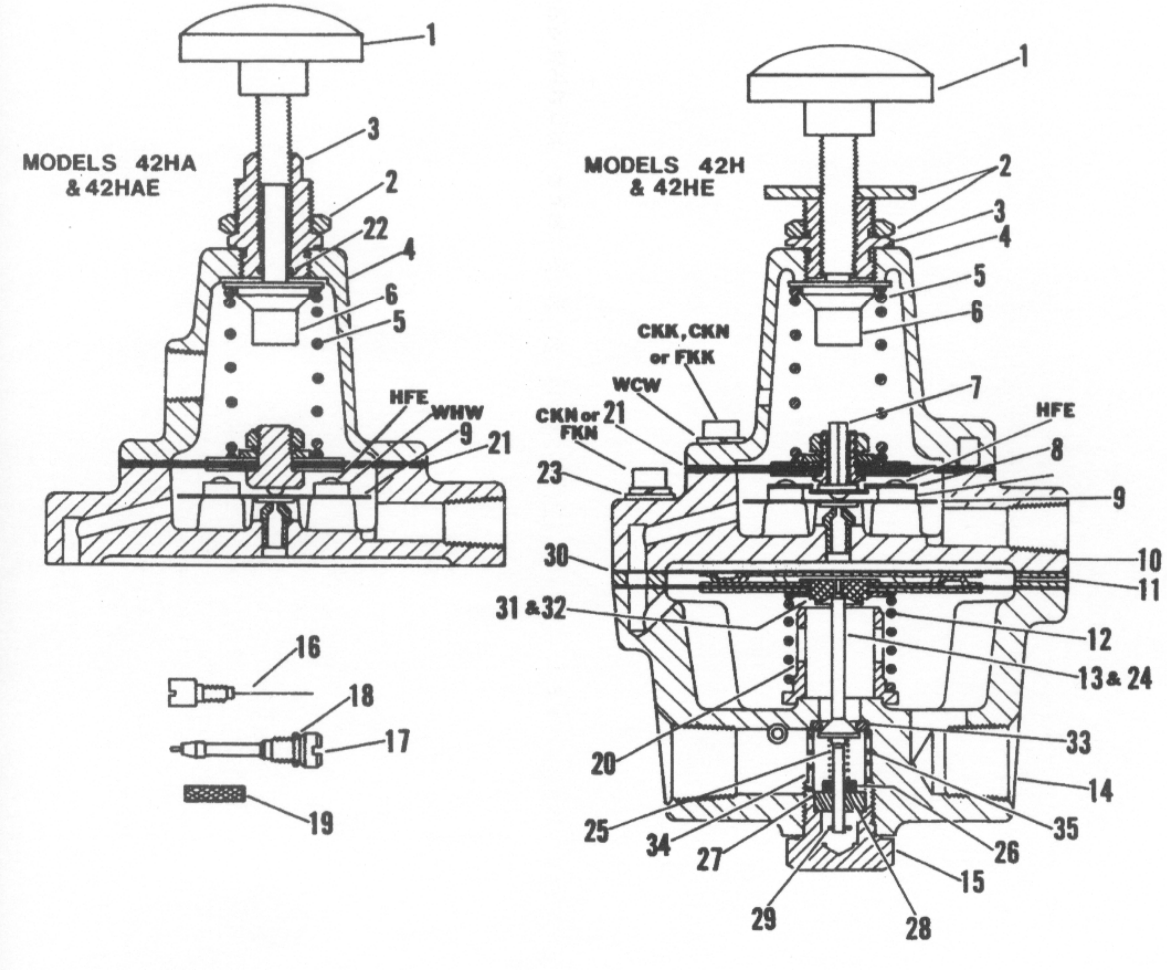
PARTS LIST

Siemens Nullmatic® Pressure Regulator

Drawing 7025PL
11/87 Supersedes 9/81

MODEL	B/M
42H30	7025-93S3
42H50	7025-95S3
42H100	7025-100S6
42HA30	8334-10N2
42HA50	8334-11N2
42HA100	8334S14
42HE30	7322S15
42HE50	7322-10N2
42HE100	7322-11N4
42HAE30	10049-10N2
42HAE50	10049-11N2
42HAE100	10049S13



IMPORTANT

Service Parts Kits are available for servicing the instrument. Contact Siemens for currently available kits; refer to the Customer/Product Support section of this instruction. Some parts in this Parts List may not be available for separate purchase.

Item No.	Part No.	Description	Required 42H	42HA	42HE	42HAE
1a	1447-22	Adj. Screw & Knob Assy.	1	—	1	—
1b	3179-4	Adj. Screw & Knob Assy.	—	1	—	1
2a	1447-41	Locknut (Optional)				
2b	3603-14	Mounting Nut	1	1	1	1
2c	3603-5	Locknut (Optional, Not Shown)				
3a	2155-165	Bushing	1	—	1	—
3b	3494-4	Bushing	—	1	—	1
4a	2155-13	Top Casting	1	—	1	—
4b	4557-11	Top Casting	—	1	—	1
4c	3827-7	Top Casting (42HE100 only)	—	—	1	—
5a	572-36	Spring (30 psi)	1	1	1	1
5b	2155-22	Spring (50 psi)	1	1	1	1
5c	2155-23	Spring (100 psi)	1	1	1	1
6	1447-24	Spring Seat Assy.	1	1	1	1
7	2155-62	Safety Release Valve (42H30 & 42H50 only)	1	—	—	—
8	572-51	Stripper Plate (42H30 & 42H50 only)	1	—	—	—
9	1447-11	Nozzle Seat Assy.	1	1	1	1
10	4952-3	Center Casting & Nozzle Assy.	1	1	1	1
11a	7025-43	Exhaust Ring	1	1	—	—
11b	6194-13	Exhaust Ring	—	—	1	1
12a	1912-25	Diff. Spring (30 & 50 psi)	1	1	1	1
12b	1912-53	Diff. Spring (100 psi only)	1	1	1	1
* 13	7025-70	Valve Plunger Assy. (Incl. Items 24 to 29)	1	1	1	1
14a	7025-58	Bottom Forging	1	1	—	—
14b	7025-59	Bottom Forging	—	—	1	1
* 15	1912-59	Retaining Nut	1	1	1	1
* 16	1033-22	Cleaning Wire	1	1	1	1
* 17	10792-10	Restriction Screw (Incl. Item 18 & 19)	1	1	1	1
* 18	2938-154	"O" Ring	1	1	1	1
19	111-20	Screen	1	1	1	1
20	4952-50	Stop Bushing (100 psi only)	1	1	1	1
* 21a	2155-71	Top Diaphragm Assy. (42H30 & 42H50 only)	1	—	—	—
* 21b	1977-4	Top Diaphragm Assy. (42H100 & All 42HA, 42HE & 42HAE)	—	1	1	1
22	2938-1	"O" Ring	—	1	—	1
23	118-36	Washer (100 psi only)	8	8	8	8
24	7025-10	Valve Plunger	1	1	1	1
25	7025-50	Valve Spring	1	1	1	1
26	7025-17	Cup Retainer	1	1	1	1
27	1912-60	Spacer	1	1	1	1
28	2938-5	"O" Ring	1	1	1	1
29	6774-3	Retaining Ring	1	1	1	1
* 30	1912-7	Diaphragm	1	1	1	1
* 31	7025-39	Exhaust Diaphragm Assy.	1	1	1	1
32	4952-24	Bottom Ring Assy. (Incl. Items 11a, 30 & 31)	1	1	1	1
33	7025-56	"O" Ring	1	1	1	1
34	1912-58	Screen	1	1	1	1
35	1912-61	Spring	1	1	1	1

Code	Hardware	Required 42H	42HA	42HE	42HAE
CKK	1/4—20 x 3/4" Lg. Fill. Hd. Screw (42H30, 42H50, 42HE30 & 42HE50 only)	6	—	6	—
CKN	1/4—20 x 1" Lg. Fill. Hd. Screw (All 30 & 50 psi Models)	8	14	8	14
FKK	1/4—20 x 3/4" Lg. Soc. Hd. Screw (42H100 & 42HE100 Only)	6	—	6	—
FKN	1/4—20 x 1" Lg. Soc. Hd. Screw (All 100 psi Models)	8	14	8	14
HFE	#4-40 X 3/8" Lg. Pan Hd. Screw Type "F"	2	2	2	2
WCW	1/4" Lockwasher	14	14	14	14
WHW	#6 Flatwasher (42H100 & All 42HE & 42HAE Models)	2	—	2	2

* Recommended On-Hand Spare Parts. Always Specify Range, Serial No., or Other Nameplate Information When Ordering Spare Parts.